SANDIA NATIONAL LABORATORIES
WASTE ISOLATION PILOT PLANT

Analysis Plan for Salado Hydraulic-Test Interpretations

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1. INTRODUCTION AND OBJECTIVES

This Analysis Plan directs the interpretation of hydraulic tests performed in the Salado Formation at the Waste Isolation Pilot Plant (WIPP) site for programmatic decision purposes. The Waste Isolation Pilot Plant (WIPP) is a permanent disposal facility for transuranic waste and is owned by the Department of Energy (DOE). WIPP is certified for permanent disposal of transuranic waste by the Environmental Protection Agency (EPA). EPA requires demonstration of ongoing compliance with applicable regulations. Performance-assessment calculations and shaft and room seal designs require detailed hydrologic characterization of the Disturbed Rock Zone (DRZ) surrounding the repository. In support of these activities, hydraulic-test interpretations are performed to obtain estimates of some or all of the following hydraulic properties:

- Permeability-thickness product (transmissivity);
- Storativity;
- Anisotropy;
- Flow dimension; and/or
- Formation pore pressure.

An additional objective is the quantification of uncertainties associated with the estimates of the hydraulic parameters.

2. APPROACH

The analytical approach to be followed is well established and has been used on the WIPP project for many years. The scientific approach and assumptions are documented in Beauheim et al. (1993; Appendix B) and Roberts et al. (1999; Chapter 6). The computer codes to be used for analysis include GTFM v. 6.2, and, when completed and qualified under NP 19-1 *Software Requirements*, nSIGHTS v. 1.0. The input to these codes consists of some or all of the following:

- transient pressure data;
- transient flow-rate data;
- well radius;

- equipment volume;
- tested thickness;
- fluid density; and/or
- distance from source well.

3. SOFTWARE LIST

Three computer codes may be used for the analysis of hydraulic-test data:

- GTFM v. 6.2 (qualified under NP 19-1); and
- nSIGHTS v. 1.0 (when completed and qualified under NP 19-1).

Off-the-shelf spreadsheet programs, such as Excel 97, and graphing programs, such as Grapher 2.0 and Surfer 6.0, will also be used for data manipulation and plotting.

4. TASKS

The tasks to be performed in connection with a hydraulic-test analysis are the following:

- Assemble data on equipment configuration and borehole dimensions;
- Assemble data relevant to the performance of the test;
- Assemble data files to be used in interpretation;
- Manipulate data files in a spreadsheet to put in the proper input format for the analysis code(s);
- Plot data to evaluate data quality and develop preliminary model conceptualization;
- Analyze data with selected code(s);
- Produce hardcopy plots of final simulations;
- Make copies of input files and final output files; and
- Prepare analysis package, obtain necessary reviews, and submit to records center.

All tasks will be documented in a scientific notebook by the analyst as the analysis progresses. The principal analyst for Salado hydraulic tests is Randall M. Roberts, 6821. Analyses

may also be performed by Richard L. Beauheim, 6821. Analysis packages will be prepared, reviewed, and submitted by the responsible analyst according to Appendices B and C (*Analysis Records* and *Routine Calculation Requirements*, respectively) of NWMP procedure NP 9-1 *Analyses* at the completion of each set of related analyses.

5. SPECIAL CONSIDERATIONS

No special considerations have been identified.

6. APPLICABLE PROCEDURES

All applicable NWMP quality-assurance procedures will be followed for these analyses. Training of personnel will be done in accordance with the requirements of NP 2-1 *Qualification and Training*. Analyses will be performed and documented in accordance with the requirements of NP 9-1 *Analyses* and NP 20-2 *Scientific Notebooks*. All software used will meet the requirements of NP 19-1 *Software Requirements*. The analyses will be reviewed following NP 6-1 *Document Review Process*.

7. REFERENCES

Beauheim, R.L., R.M. Roberts, T.F. Dale, M.D. Fort, and W.A. Stensrud. 1993. *Hydraulic Testing of Salado Formation Evaporites at the Waste Isolation Pilot Plant: Second Interpretive Report*. SAND92-0533. Albuquerque, NM: Sandia National Laboratories.

Roberts, R.M., R.L. Beauheim, and P.S. Domski. 1999. *Hydraulic Testing of Salado Formation Evaporites at the Waste Isolation Pilot Plant Site: Final Report*. SAND98-2537. Albuquerque, NM: Sandia National Laboratories.